



A REMOTENESS-ORIENTED APPROACH TO DEFINING, PROTECTING AND RESTORING WILDERNESS

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ABSTRACT

There is widespread recognition of the need to protect wilderness and its associated values, which are under increasing threat around the world. However, there is no consensus on how wilderness should be defined. This is not merely a semantic concern, as the definition of wilderness has real-world implications for how wilderness is identified, protected and managed. A globally agreed definition would provide a common framework for global and regional inventories of wilderness, and would be advantageous if wilderness is to be more systematically protected under the World Heritage Convention. Existing definitions vary in the emphasis that they place on ecological and experiential values, and in the stringency of the conditions that they set for an area to qualify as wilderness. Few definitions acknowledge the significance of remoteness, which is strongly linked to the experiential values of wilderness. Remoteness is also a measure of landscape integrity, which contributes to the ecological viability and other values of wilderness areas. Requiring a wilderness area to be large does not ensure that it will contain remote country. We propose a descriptive definition of wilderness that recognises its experiential as well as its ecological, Indigenous and other values, and that incorporates remoteness as a defining characteristic of wilderness. We discuss the implications of this definition for how wilderness is measured, classified, protected, managed and restored.

Key words: wilderness, definition, Wild Character, remoteness, experiential values, remoteness area, wilderness region, wilderness protected area, wilderness restoration

INTRODUCTION

The word ‘wilderness’ is generally associated with extensive, wild and largely natural areas – areas free of roads and industrial infrastructure, and largely free of other evidence of disturbance by modern technological society (Kormos & Locke, 2008). We will henceforth use the word in this sense until we offer a more precise definition. It is generally accepted (e.g. Casson et al., 2016) that the condition of many wilderness areas has been influenced by the presence and/or activity (in some cases ongoing) of Indigenous people.

At a time of global environmental crisis, the preservation of wilderness areas is a matter of urgent priority. Such areas provide vital ecological functions, and have important Indigenous, experiential and sociocultural values. However, the extent and quality of such areas are declining globally due to a range of factors including anthropogenic climate change, forest clearance, road construction and tourism development (Kormos et al., 2015).

How we define wilderness reflects the values that we associate with wilderness and that we hold to be worth protecting. However, there is currently no consensus on the definition of wilderness (Carver & Fritz, 2016; see Table 1). This is far from a semantic concern, as the definition has real-world implications for how wilderness is identified, protected and managed (Hawes et al., 2018; Bastmeijer, 2016; Wartmann et al., 2019). A globally agreed descriptive definition and consistent terminology would provide a firm foundation for global initiatives to protect high-quality wilderness, particularly if wilderness is to be more systematically protected under the World Heritage Convention, as advocated by Kormos et al. (2015) and others.

WILDERNESS AS AN EVOLVING CONCEPT

The word wilderness is derived from northern European languages and originally referred to the ‘place of wild animals’ (Kormos & Locke, 2008). The modern conception of wilderness as a place of inspiration and wholesome recreation, as advocated by campaigners

such as Aldo Leopold, John Muir and others (Woods, 2017), emerged from the industrialisation of Europe and from the rapid expansion of roads, settlement, agriculture and extractive industries across the previously natural/Indigenous landscapes of the New World (Kormos & Locke, 2008).

Wilderness is therefore a primarily Western concept. However, comparable views of natural areas as places of spiritual replenishment, inspiration and sanctuary can also be found in other cultures, for example in third- and fourth-century Chinese poetry (Tin & Yang, 2016), in the forest preservation policies of Sri Lanka's Kandyan rulers (Alwis, 1999), in Russia's system of Zapovedniki (Casson et al. 2016), and in Indigenous conceptions of wilderness and sacred natural sites (Verschuuren et al., 2010).

The concept of wilderness has been and remains challenged by some postmodernists and Indigenous groups. One objection is that Western conceptions of 'naturalness' have historically ignored the role that Indigenous people have played in modifying the biota and landscapes of many areas now regarded as 'wilderness' (Casson et al., 2016). Contemporary definitions of wilderness redress this by stressing that wilderness includes areas that are or have been sustainably inhabited, utilised or influenced by Indigenous people following traditional, wilderness-based ways of life (Casson et al., 2016).

THE VALUES OF WILDERNESS

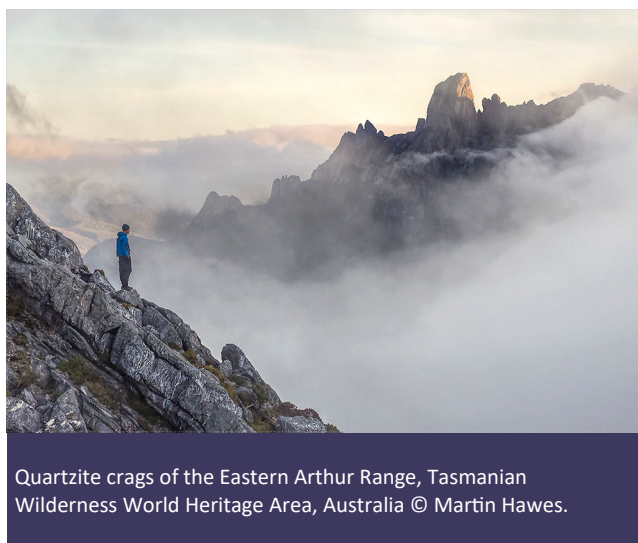
The values of wilderness have been described by Cordell et al. (2005), Casson et al. (2016) and many others. These values, which can be broadly categorised as

ecological, Indigenous, experiential, sociocultural and intrinsic, are often coexistent and complementary. The fact that this is not always the case does not, in our view, justify leaving wilderness undefined or narrowing its definition to a single value (e.g. defining wilderness purely in terms of biodiversity). The following briefly summarises the values of wilderness, as a background to our argument that the definition of wilderness can and should take all of them into account.

Wilderness areas are places where ecological processes can continue largely unhindered by human development (Mackey et al., 1998; Dudley, 2013). They provide essential ecosystem services including climate stabilisation, carbon sequestration, nitrogen fixation and the maintenance of freshwater quality (Mittermeier et al., 2003; Kormos et al., 2015). They are essential to climate change mitigation and adaptation (Dudley, 2013). And they represent important biological benchmarks, providing examples of how intact or largely intact ecosystems function and evolve (European Commission, 2013). Although wilderness areas are not typically speciose, they hold the bulk of the planet's biomass and the last remaining intact megafaunal assemblages (Mittermeier et al., 2003; Watson et al., 2016). They are now the only places that contain mixes of species at near-natural levels of abundance (Watson et al., 2018). They act as a buffer against species loss, as the average extinction risk for species within wilderness is less than half that of species in non-wilderness communities (Di Marco et al., 2019).

Wilderness areas are often areas of immense cultural and spiritual significance to Indigenous people. Many are home to Indigenous cultures living at low densities, and provide livelihoods to local communities – communities that are often politically and economically marginalised (Casson et al., 2016; Watson et al., 2016). Some Indigenous people have embraced wilderness preservation as a way of protecting their culture and heritage (Cessford, 2001; Confederated Salish and Kootenai Tribes, 2005).

The experiential values of wilderness include opportunities for challenging, self-reliant recreation, physical and mental challenge, solitude, freedom, inspiration, awe, wonder, transformation and connection (Ashley et al., 2015). Journeys into wild places can bring benefits in terms of physical, mental and spiritual health, including reduced risks of disease and lower stress levels (Ewert et al., 2011). The existence, character and beauty of such areas can be appreciated and enjoyed vicariously through media such as writing and photography, or simply by contemplation



Quartzite crags of the Eastern Arthur Range, Tasmanian Wilderness World Heritage Area, Australia © Martin Hawes.

(Ashley et al., 2015). Many people find solace just from knowing that wilderness exists (e.g. Weinberg, 2014).

Wilderness areas are associated with cultural values and non-material benefits for both Indigenous and non-Indigenous populations, such as solitude, respect for sacred sites and respect for ancestors (Dudley, 2013). They provide avenues to change human attitudes, belief systems and behaviours, for example by fostering environmental consciousness (Ewert et al., 2011). They are an invaluable resource for education and for inspiring cultural and artistic expression (European Commission, 2013).

There is growing appreciation of the intrinsic value of nature and the importance of respecting and protecting the diversity of life on Earth, regardless of its direct or even indirect benefit to humans (Casson et al., 2016). Many people believe that areas of the natural world that exist and flourish in a largely unaltered condition, independently of human needs and desires, have intrinsic value (Nelson & Vucetich, 2013).

WILDERNESS AND REMOTENESS

The significance of remoteness

The experiential values of wilderness are strongly linked to its remoteness, for three closely related reasons. Firstly, remote settings can be perceived and experienced as places where extensive landscapes remain largely undisturbed by anthropogenic disruptions such as road construction, mining and the clearance of native vegetation. They are places where the visitor can stand with their senses steeped in nature and be confronted with the vastness of the natural world (Hawes et al., 2018).

Secondly, remote settings provide opportunities for challenging and self-reliant recreation, particularly if they require at least one overnight stay in a remote location (Dudley et al., 2012). Such settings can also offer outstanding opportunities for solitude.

Thirdly, the impact on experiential values of anthropogenic features such as buildings, and of activities such as aircraft overflights, is not confined to their immediate footprints but extends over surrounding areas (Carver & Tin, 2015). This impact is best conceptualised and measured as a continuous rather than a binary variable, and is best defined in terms of 'remoteness from' rather than 'the absence of' features such as buildings and disturbances such as overflights.

The remoteness of an area can contribute to its ecological values. Physical distance from disturbances

such as logging and land cleared for agriculture can help to buffer an area from ecological impacts such as anthropogenic fire, air and water pollution, and invasive species (Landres, 2013). Access-time remoteness can help to protect it from impacts such as poaching and recreational trampling (Hawes et al., 2018). Research indicates that the ecological impacts of roads extend several kilometres beyond their immediate footprint (Ibisch et al., 2016). As we explain below, protected areas designed to optimise remoteness have spatial characteristics including largeness that are conducive to ecological protection. Remoteness can also protect cultural and archaeological features (such as sacred sites) from impacts such as theft, vandalism and unsanctioned visitation (DPIPWE, 2016).

Some definitions of wilderness explicitly require wilderness areas to be remote or to have qualities of remoteness (e.g. Robertson et al., 1992; DPIPWE, 2016). Others imply or mention remoteness without explicitly requiring it (e.g. US Wilderness Act 1964; European Commission, 2013). Measurements of remoteness and naturalness are used in one form or another in nearly all models of wilderness quality (Carver & Fritz, 2016). Landres et al. (2015) note that remoteness from the sights and sounds of civilisation is important for achieving a sense of solitude.

Remoting areas and wilderness regions

There is already considerable confusion around the meaning of terms such as 'wilderness area', and we appreciate the risks associated with offering additional definitions. Nevertheless, if the significance of remoteness is to be adequately recognised, the definition of wilderness should reflect this. This requires that a new (or at least refined) definition of wilderness be introduced, as well as some new terminology. Moreover, it requires that the definition of these terms be crystal clear and carefully observed.

Any location or area that is remote (for example from roads and buildings) must necessarily be surrounded by a tract of land or sea whose undeveloped condition (for example, absence of roads and buildings) makes that location or area remote. We will use the term *remoting area* to refer to this surrounding area. Note that we are using this term descriptively, not as a management designation.

If, as we recommend, one defines wilderness in a way that requires it to be remote, then any area of wilderness must necessarily (i.e. logically) have an associated remoting area.

For example, suppose one defines wilderness simply as land that is at least 5 km remote from the nearest road. Figure 1 shows a region that contains a network of roads as well as a substantial area of roadless country. The area shaded green in Figure 1 depicts the '5 km wilderness', and the yellow area is its associated remoting area.

Note that the remoting area extends out to roads in some places but not in others. Additional road construction outside the remoting area would not affect the area of the '5 km wilderness', but the intrusion of roads anywhere inside the remoting area would reduce the area of wilderness.

We propose establishing more elaborate standards of remoteness that an area needs to satisfy to qualify as wilderness. But the concept of a remoting area is still valid: it is the area whose existence and undeveloped condition (such as being free of roads and other major infrastructure) ensures that the wilderness area meets those standards.

We will use the term *wilderness region* to refer to any region comprising one or more wilderness areas and their associated remoting areas. For example, in Figure 1 the boundary of the wilderness region coincides with the outer edge of the yellow area.

Size, compactness and contiguity

The capacity of an area to offer and protect ecological and experiential values is dependent on both its size (i.e. largeness) and shape. In general, the largeness of an area contributes to its 'wildness' and its capacity to offer opportunities for solitude and other spiritual experiences (European Commission, 2013). Larger areas can also enhance the options and opportunities for ecological conservation (European Commission, 2013; Dudley, 2013).

The compactness and contiguity of an area are also relevant to its capacity to protect ecological values (Nalle et al., 2002). While 'elongated' and fragmented areas may encompass a greater range of environments and habitats, their higher edge-to-area ratio relative to more compact, 'circular' areas negatively influences species survival (Durán et al., 2016). Larger, more intact natural areas have higher inherent connectivity, providing the best opportunities for effective long-term retention of species and communities and ecological processes, including buffering against large-scale threatening processes such as climate change and fire

(Lesslie, 2016). For these reasons, protected areas are generally recommended to have compact shapes (Durán et al., 2016).

The relationship between remoteness and size, compactness and contiguity

Many current definitions of wilderness require wilderness areas to be large. However, large size does not guarantee that an area will be compact or contiguous, nor that it will contain remote country. This is illustrated in Figures 2–5.

The areas shaded green in Figures 2 and 3 represent roadless regions bordered by roads. It is assumed that the two regions are free of other major infrastructure such as buildings and are in a largely natural condition. Region 2 excludes a narrow corridor of land bordering a mine and its access road. The two regions have the same surface area (just over 110,000 hectares).

Since both regions are large, both would qualify as 'wilderness areas' by many definitions. Indeed, if one ignores the relevance of remoteness to wilderness values, the equivalence of the two regions in terms of size and naturalness would appear to translate into an equivalence of wilderness values. However, Figures 4 and 5 illustrate that Region 1 encompasses substantially larger areas of remote land, and land with substantially higher remoteness, than does Region 2. Note that the road and mine in Region 2 have a drastic impact on its remoteness, despite having little impact on its overall area. Note also that the 'peninsula' of land at point A

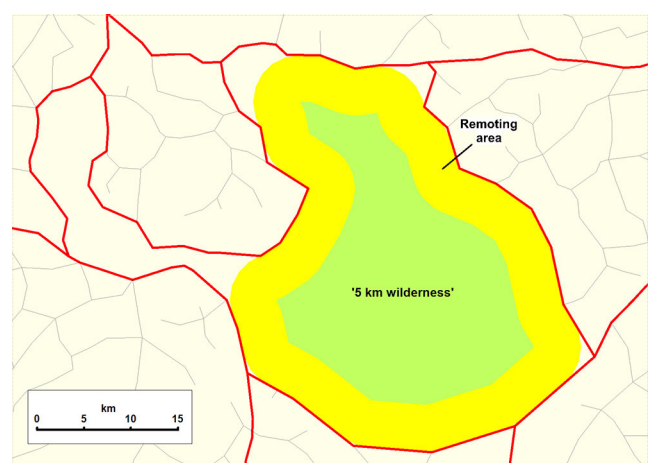


Figure 1. An area of 5-km remote wilderness and its associated remoting area. Red and grey lines indicate major and minor roads respectively

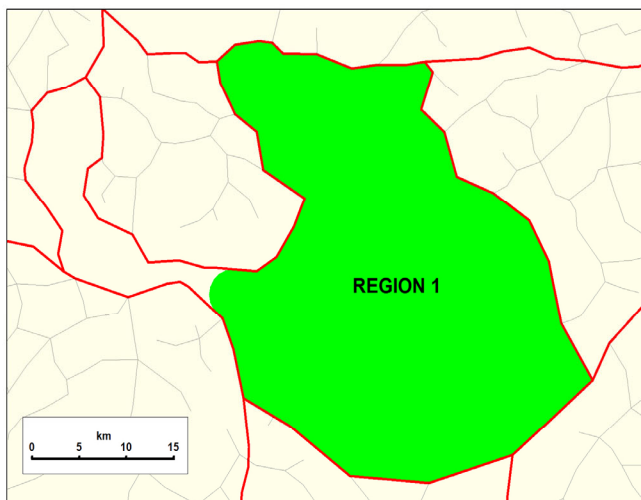


Figure 2. Region 1—the green area indicates a roadless region. Major and minor roads are indicated with red and grey lines respectively.

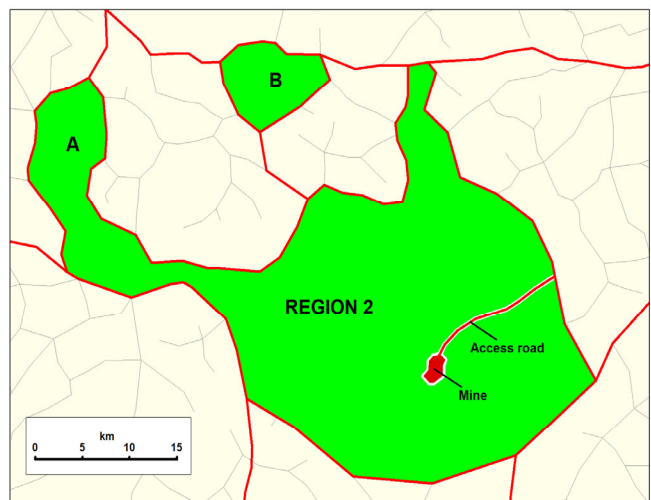


Figure 3. Region 2 (which includes area B) is also roadless, and has the same surface area as Region 1. The region excludes a narrow corridor of land bordering a mine and its access road

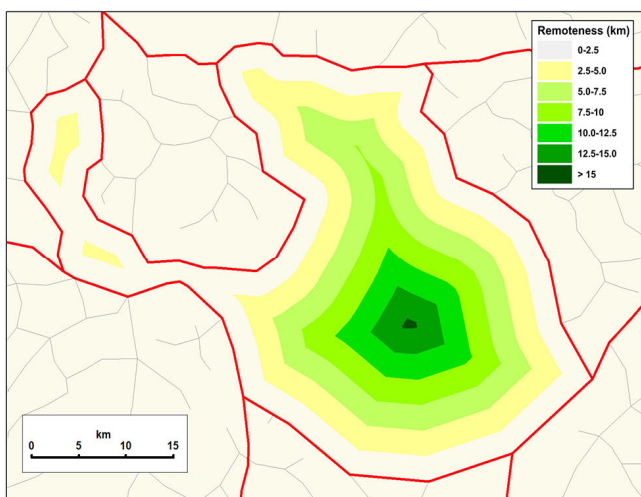


Figure 4. Isolines of remoteness from roads, shaded in 2.5 km intervals, within Region 1

and the outlier at point B, while contributing significantly to the area of Region 2, contribute little to its remoteness.

The converse of our earlier statement is not true, since requiring wilderness to be remote does ensure that the wilderness region associated with any wilderness area will be large. The wilderness region corresponding to a contiguous wilderness area will also be contiguous and will tend to be compact, since the buffering associated with the remoteness area will tend to smooth any indentations in the wilderness area to which it corresponds (see Figure 1).

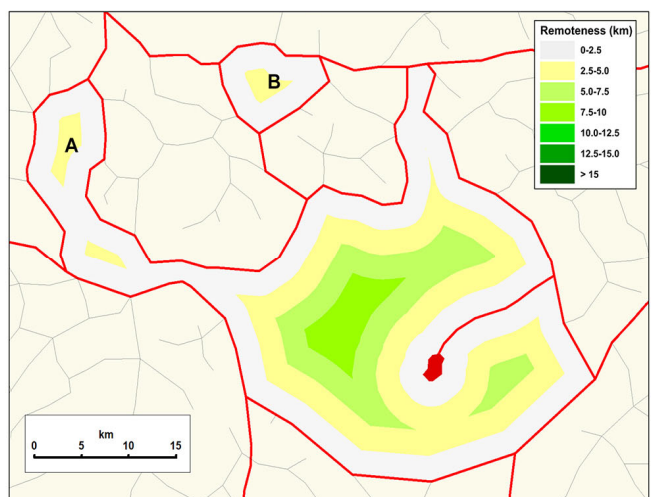


Figure 5. Isolines of remoteness from roads, shaded in 2.5 km intervals, within Region 2

DEFINING WILDERNESS

Ecological refuge or recreational asset?

Much of the emphasis of early campaigns to protect wilderness focused on its experiential values (Woods, 2017), a fact that is reflected in, for example, the wording of the US Wilderness Act 1964. Since the 1990s, the prevailing focus of wilderness protection, and indeed of conservation generally, has been ecological (Mackey et al., 1998; Casson et al., 2016), to the point where the other values of wilderness are frequently overlooked (Sawyer, 2015; Bastmeijer, 2016). In consequence, some current definitions of wilderness are couched purely in ecological terms.

Description or management designation?

Casson et al. (2016) identify three ways in which the word ‘wilderness’ is used: as a descriptor of the condition of an area, as a management designation, and as a designator of a set of cultural values. They point out that the word is often used loosely and colloquially to refer to almost any manifestation of naturalness, in contrast to artificial human environments. Here we are concerned only with the first two uses of the word, and it is important to draw a clear distinction between them, particularly when defining the terms ‘wilderness’ and ‘wilderness area’.

The descriptive use equates the terms ‘wilderness’ and ‘wilderness area’ with the actual condition of an area of land (or sea). The ‘condition’ in question is likely to include the area’s biological naturalness, but it may also include factors such as its remoteness, the presence or otherwise of human infrastructure, and usage factors such as accessibility by motorised vehicles. Crucially, the description as wilderness or non-wilderness applies regardless of an area’s management designation.

Used as a management designation, the term ‘wilderness area’ designates the conditions that a management regime is intended to maintain or attain, whether or not those conditions actually exist within the designated area.

The descriptive and designative uses of the terms ‘wilderness’ and ‘wilderness area’ are sometimes referred to as *de facto* and *de jure* (e.g. Cao et al., 2019). The distinction is particularly relevant to the question of whether wilderness (or a wilderness area) needs to be remote and/or large. For example, the narrowest parts of Region 2 in Figure 5 might be part of a designated ‘wilderness area’ by some definitions. But these areas are not remote, and hence are not wilderness by our recommended definition.

Other considerations relevant to how wilderness is defined

Definitions can be either qualitative or quantitative, the latter specifying thresholds (such as minimum size or remoteness) that an area must satisfy to qualify as ‘wilderness’ or as a ‘wilderness area’.

If thresholds are set, a key question is whether the bar is set high or low. An argument could be made for reserving the word ‘wilderness’ for exceptionally wild areas, such as parts of the Serengeti and the Gates of the Arctic. At the other extreme, Diemer et al. (2003) used the term ‘wilderness’ to refer to revegetating urban



Rafting a remote river in the Tasmanian Wilderness World Heritage Area, Australia © Grant Dixon

areas as small as 20 ha, including former railway yards and mine areas. Such designations may be advantageous in terms of protecting the areas in question, but they risk weakening the meaning of the word ‘wilderness’ and fostering the belief that industrial and other development are acceptable in or adjacent to wilderness areas.

Thresholds are also relevant to the determination of naturalness, especially in the Anthropocene epoch when no part of the planet is entirely free from human pollution or immune to the effects of climate change. Moreover, as we noted earlier, many areas that may now be considered wilderness have been modified ecologically by past and/or ongoing use by Indigenous people. Clearly no wilderness area can be counted as entirely natural. Rather, wilderness must be defined in terms of naturalness relative to more intensively modified, polluted and developed environments.

Scale is also relevant here, as the criteria that might be appropriate for a global or continental inventory of wilderness might be unsuitable for assessing wilderness at a regional level (Wartmann et al., 2019).

Current definitions of wilderness

Table 1 lists several current definitions of wilderness (necessarily abbreviated). Note that the European Commission and Kormos et al. (2015) definitions are descriptive. The IUCN and US Wilderness Act definitions are management designations, although they include descriptive elements insofar as they stipulate the minimum conditions of size and naturalness that an area must satisfy in order to be designated as

Table 1. Examples of existing definitions of wilderness*

Agency/author	Definition
IUCN	Category Ib protected areas [i.e. wilderness areas] are usually large unmodified or slightly modified areas, retaining their natural character and influence, without permanent or significant human habitation, which are protected and managed so as to preserve their natural condition. (Dudley, 2013)
US Wilderness Act 1964	A wilderness, in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammelled by man, where man himself is a visitor who does not remain.
European Commission	A wilderness is an area governed by natural processes. It is composed of native habitats and species, and large enough for the effective ecological functioning of natural processes. It is unmodified or only slightly modified and without intrusive or extractive human activity, settlements, infrastructure or visual disturbance. (European Commission, 2013)
The Wild Foundation	The most intact, undisturbed wild natural areas left on our planet – those last truly wild places that humans do not control and have not developed with roads, pipelines or other industrial infrastructure. (Wild Foundation, undated)
Tasmanian Wilderness World Heritage Area Management Plan 2016	A wilderness area is an area that is of sufficient size, remoteness and naturalness to enable the long-term integrity of its natural systems, diversity and processes, the maintenance of cultural landscapes and the provision of a wilderness recreational experience. (DPIPWE, 2016)
Kormos et al. (2017)	Landscapes and seascapes that are biologically and ecologically largely intact, with a low human population density and that are mostly free of industrial infrastructure.

* Note: The text here comprises excerpts only. The full definitions are in some cases much longer.

wilderness. Note also that the Kormos definition is couched almost exclusively in ecological terms. Other definitions acknowledge experiential and cultural values to varying degrees, but most give greater emphasis to ecological values.

RECOMMENDED APPROACH TO DEFINING, MEASURING, DELINEATING AND CLASSIFYING WILDERNESS

Recommended definition

In view of our concerns about the shortcomings of existing definitions of wilderness, we have drafted and recommend the following qualitative, descriptive definition. The definition is relevant to wilderness on land, including inland waterways.

Wilderness is land characterised by a high degree of biophysical naturalness, linear remoteness from infrastructure and landscape disturbances, and time-remoteness from points of mechanised access, as well as having minimal evidence of modern technological society. Wilderness by this definition can include areas that are or have been sustainably inhabited, utilised and influenced by Indigenous people following traditional, wilderness-based ways of life.

This definition encompasses the ecological, Indigenous, experiential, sociocultural and intrinsic values of wilderness, and recognises remoteness as a defining characteristic of wilderness.

As the definition is qualitative, we believe it is potentially applicable to all parts of the world and all environments. The fact that the term ‘high degree’ is relative allows the definition to be interpreted according to the levels of wildness that prevail wherever it is being applied.

We recommend the term *Wilderness Protected Area* (WPA) to designate areas whose primary management objectives are nature conservation and the preservation and/or restoration of wilderness. Henceforth, we will use the term ‘wilderness area’ solely in a descriptive context, i.e. to mean an area of wilderness as defined above.

Measuring and mapping wilderness

It is clearly desirable that a methodology for measuring and mapping wilderness be conceptually compatible with the way wilderness is defined.

Methodologies for measuring and mapping wilderness date back to at least the 1960s (e.g. Penfold, 1961). Two key approaches can be identified, namely the ‘binary’ approach that distinguishes ‘wilderness’ from ‘non-wilderness’, and the ‘continuum’ approach that assesses wilderness quality (or a similar term) as a continuous variable with no definite boundary. Global wilderness assessments (McCloskey & Spalding, 1989; Mittermeier et al., 2003; Watson et al., 2016) have taken a binary approach based on area and other factors. A ‘continuum’

methodology developed in Australia by Lesslie and Taylor (1985), which has become the template for subsequent wilderness assessments in many parts of the world, defined wilderness quality as the sum of four components, three of which were defined in terms of remoteness.

Cao et al. (2019) used a combination of binary and continuum approaches to assess wilderness in China, initially identifying wilderness areas based on remoteness, and then classifying these areas according to their mean wilderness quality. Comber et al. (2010) and Fritz et al. (2000) assessed wilderness based on surveys of user perceptions, incorporating fuzzy logic into the calculation of wilderness values. While the latter approaches are arguably more ‘real-world’ and sophisticated, the authors acknowledge that their complexity ‘has not increased the ease of decision making’ (Comber et al., 2010).

We endorse existing remoteness-based methodologies for measuring wilderness, particularly those based on variants of the Lesslie and Taylor (1985) approach. We recommend using the term *Wild Character* to refer to the quantity measured by continuum-based methodologies, as it can be usefully applied not only to wilderness areas but also to non-wilderness areas that have a significant degree of wildness. The term also helps to clarify the distinction between wildness (*Wild Character*) as a continuum and wilderness/non-wilderness as a binary classification.

Recommended approach to delineating and classifying wilderness areas

Wilderness protection requires drawing lines on maps (Bastmeijer, 2016). Delineating wilderness based on thresholds of remoteness is a simple approach clearly related to our recommended definition. Such a classification system would be potentially useful for regional and global wilderness assessments, and as a basis for wilderness management.

Perceptions of what constitutes wilderness vary widely (Kliskey & Kearsley, 1993; McMorran et al., 2008). What might pass for wilderness in Europe might barely rank as such alongside many Alaskan or Siberian wilderness areas. To accommodate such variations, we propose a 4-tiered classification system for wilderness. The system can be applied either descriptively or prescriptively: for example, Class B could apply either to a wilderness area (regardless of its management status), or to a WPA whose function is to protect a Class B wilderness area.

The system is based on thresholds of linear remoteness and access-time remoteness (see Figure 6 and Table 2). The former would be measured from major infrastructure such as roads, dams, power lines and major buildings, as well as from areas of significant disturbance of the environment such as logging areas, land cleared for agriculture, impoundments and plantations. The latter would be measured from points of mechanised public access including publicly accessible roads, navigable waterways and aircraft landing sites.

The classification system proposed here is similar to the European Wilderness Quality Standard and Audit System proposed by the European Wilderness Society (2019). However, the latter has been formulated solely in a European context, and while it takes size into account, it only indirectly takes account of remoteness. Our least remote category of wilderness (i.e. Class D) might better be called ‘wild area’, a term that is often preferred in a European context (European Wilderness Society, 2019).

The half-day threshold of access-time remoteness (nominally 3.5 hours, in terms of travelling time without breaks) has particular significance because visiting areas exceeding this threshold requires an overnight stay in roadless country. The 5 km threshold of linear remoteness has been used in other studies, such as those by Ólafsdóttir et al. (2016). Ibsch et al. (2016) determined that 14 per cent of road-related impacts extended 5 km from roads.

For wilderness of any category to exist, it must (logically) be surrounded by a remoteness area that

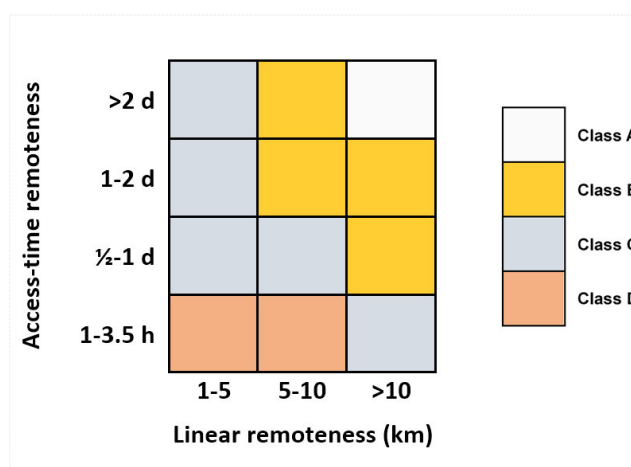


Figure 6. Suggested wilderness classification system based on thresholds of linear and access-time remoteness

Table 2. Some characteristics of our suggested wilderness classification system, with examples. See also figure 6.

Proposed wilderness classes	Description
Class A	‘Crème de la crème’ wilderness, having a high degree of both linear and access-time remoteness (at least two days and 10 km). Examples: Extensive areas of Jaú National Park, Brazil; Thoroughfare region of Teton Wilderness, USA.
Class B	Wilderness areas that are at least 5 km and one day remote, or at least 10 km and half a day remote. Examples: Lake Kardyvach, Kavkazkiy Nature Reserve World Heritage Area, Russia; Pelion Range, Tasmanian Wilderness World Heritage Area, Australia.
Class C	Wilderness areas that are at least half a day or 10 km remote. The half-day requirement ensures that visiting such areas requires at least one overnight stay in a roadless area. Class C can include areas such as mountains and gorges that have low linear remoteness but moderate access remoteness owing to rugged terrain. Examples: ‘Wildnisgebiet Sulzbachtäler’ wilderness area, Hohe Tauern National Park, Austria; Bruneau-Jarbidge Rivers Wilderness, USA.
Class D	Wild areas that are at least 1 hour remote and less than 10 km remote. Such areas provide a degree of immersion in the natural world, but are not remote enough to qualify as fully-fledged wilderness. Examples: Parts of Dartmoor National Park, UK; narrow coastal section of Daniel J. Evans Wilderness, Olympic National Park, USA.

accounts for both its linear and access-time remoteness. For example, if an area is one day and 10 km remote, it must be surrounded by a remotizing area that extends out to a distance of one day (in non-mechanised travel time) and 10 km.

Ecological naturalness is accounted for in a very basic way by requiring wilderness to be remote from disturbances such as logged areas. Remoteness from roads also tends to ensure a higher probability of naturalness. If necessary, additional criteria of naturalness can be imposed for areas to qualify as wilderness.

The question remains whether it would be preferable to delineate wilderness based on more sophisticated measurements, for example by defining Class C wilderness as areas where Wild Character exceeds a specified value. An advantage of doing so is that measurements of Wild Character could take account of a much wider range of variables, for example proximity to settlements and the extent of viewshed disturbance. The disadvantage is that, having thus identified ‘wilderness’, it would then be very difficult to determine the extent and management requirements of its associated remotizing area, owing to the complexity of the formulas whereby Wild Character is calculated.

For this reason, we recommend using simple criteria to delineate wilderness, and then using the more sophisticated approach of Wild Character measurements to fine-tune its management.

SUMMARY & POLICY IMPLICATIONS

Wilderness has outstanding ecological, Indigenous, experiential, sociocultural and intrinsic values of regional and global significance. However, there is currently no globally agreed (descriptive) definition of wilderness. The experiential values of wilderness are strongly linked to remoteness, which also contributes to its ecological values. Large size does not guarantee remoteness, but the requirement that wilderness areas be remote ensures that their associated wilderness regions will be large and have spatial characteristics such as contiguity and low boundary-to-area ratio that are advantageous for ecological conservation.

We recommend a descriptive definition of wilderness that encompasses the full range of its values and that identifies remoteness as a defining characteristic of wilderness. We also recommend delineating and classifying wilderness areas based on remoteness thresholds. These recommendations have significant implications for the design and management of WPAs.

Design and management of WPAs

The principal objective of wilderness management is to maximise remoteness from, and minimise modifications by, the impacts and influences of modern technological society (Mackey et al., 1998). To this end, WPAs must include, at a minimum, wilderness areas and their associated remotizing areas. In other words, they must include entire wilderness regions as we have defined them.

The primary management objectives of a WPA should be both to conserve nature and to maintain or restore the extent and Wild Character of the wilderness it contains. To achieve this, the entire WPA must be kept free of the kinds of infrastructure (such as roads and buildings) relative to which remoteness is defined, and free of mechanised access.

Beyond this basic requirement, the maintenance of Wild Character will require projected Wild Character to be assessed ahead of any proposed management changes or infrastructure development. Wild Character assessments should, if practical, take account of factors such as viewshed disturbances and noise pollution.

WPAs may or may not be part of larger protected areas whose function outside the WPA relates to the protection of values other than wilderness.

Wilderness and Indigenous communities

The protection of the rights of Indigenous peoples to access and utilise their traditional lands is of vital importance (Casson et al., 2016). It is generally accepted that where Indigenous communities have pre-existing interests in and rights to wilderness areas, they should be involved from the outset in the designation and management of those areas (Casson et al., 2016).

By many definitions, including the one that we recommend, wilderness can include areas that are or have been sustainably inhabited, utilised and influenced by Indigenous people following traditional, wilderness-based ways of life.

By the definition that we recommend, features associated with modern technological society such as vehicular tracks and modern buildings, and activities such as the use of motorised vehicles, would count as 'infrastructure' and as 'evidence of modern technological society' regardless of the cultural affiliations of the people who construct or engage in them. In some situations, developments in wilderness areas such as the construction of roads or communications towers might be justified on grounds such as traditional land rights and social equity; but by our definition they would be counted as a loss of wilderness.

Implications for the IUCN protected area classification system

At present, the IUCN system has a special category, namely category Ib, for wilderness areas as defined by IUCN (Dudley, 2013; see Table 1). A potential weakness of the Ib classification is that it does not ensure that remoteness is valued and protected. We recommend



Glaciated high peaks of the Central Karakoram National Park and proposed World Heritage Area, Pakistan © Grant Dixon

that the IUCN prescriptions for Ib areas be modified to acknowledge the significance of remoteness. Existing Ib areas that do not facilitate the protection and/or restoration of wilderness as we have defined it should be considered for reclassification, for example as Category Ia.

Wilderness restoration

There is currently strong interest in pursuing options for restoring wilderness, particularly in Europe where few areas of original wilderness remain (Periera & Navarro, 2015), and where the abandonment of marginal agricultural land provides opportunities for restoring some form of 'wilderness' (Höchtl et al., 2005).

In broad terms there are two pathways to restoring wilderness, namely restoring naturalness and restoring remoteness; in practice, both might be followed. The former may involve measures such as discontinuing grazing or allowing previously logged forests to regenerate (Măntoiu et al., 2016).

Restoring remoteness can potentially be achieved in significantly shorter timescales if it involves measures such as the exclusion of public vehicular access, the closure and rehabilitation of vehicle tracks, or the removal of infrastructure such as cable cars and forest tracks (Plutzer et al., 2016).



Schoolchildren and guides in the Kavkazkiy Nature Reserve, Western Caucasus World Heritage Area, Russia © Martin Hawes

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LEGISLATION

Wilderness Act 1964, USA, Public Law 88-577 (16 U.S. C. 1131-1136). 88th Congress, Second Session, 3 September.

RESUMEN

Hay un reconocimiento generalizado en torno a la necesidad de proteger las áreas silvestres y sus valores asociados, que se encuentran bajo creciente amenaza en todo el mundo. Empero, no hay consenso sobre cómo deben definirse las áreas silvestres. No se trata de una preocupación meramente semántica, ya que la definición de las áreas silvestres tiene repercusiones muy reales en cuanto a la forma en que se identifican, protegen y gestionan dichos espacios naturales. Una definición acordada a escala mundial proporcionaría un marco común para los inventarios mundiales y regionales de las áreas silvestres, y sería muy provechoso si las áreas silvestres fueran protegidas de manera más sistemática en el marco de la Convención del Patrimonio Mundial. Las definiciones existentes varían en términos del énfasis que ponen en los valores ecológicos y experienciales, y en el rigor de las condiciones que establecen para que un espacio pueda calificarse como área silvestre. Pocas definiciones reconocen la importancia de la lejanía, que está estrechamente relacionada con los valores experienciales de las áreas silvestres. La lejanía es también una medida de la integridad del paisaje, que contribuye a la viabilidad ecológica y a otros valores de las áreas silvestres. Exigir que un área silvestre sea muy extensa no garantiza que sea remota. Proponemos una definición descriptiva de las áreas silvestres que reconozca sus valores tanto experienciales como ecológicos, indígenas y de otro tipo, y que incorpore la lejanía como una característica definitoria de las áreas silvestres. Examinamos las consecuencias de esta definición en función de la forma en que se miden, clasifican, protegen, gestionan y restauran las áreas silvestres.

RÉSUMÉ

La nécessité de protéger la nature sauvage et ses valeurs associées, qui sont de plus en plus menacées dans le monde, est largement reconnue. Cependant, il n'y a pas de consensus sur la façon dont la nature sauvage devrait être définie. Ce n'est pas simplement une préoccupation sémantique, car la définition de zone de nature sauvage a des implications réelles sur la façon dont la nature sauvage est identifiée, protégée et gérée. Une définition reconnue à l'échelle mondiale fournirait un cadre commun pour les inventaires mondiaux et régionaux de zones de nature sauvage, et pourrait s'avérer bénéfique pour une protection plus systématique de la nature au titre de la Convention du patrimoine mondial. Les définitions existantes varient selon l'accent mis sur les valeurs écologiques et expérientielles et la rigueur des conditions établies pour qu'une zone soit qualifiée de zone de nature sauvage. Peu de définitions reconnaissent l'importance de l'éloignement, qui est pourtant fortement liée aux valeurs expérientielles de la nature sauvage. L'éloignement est également une mesure de l'intégrité du paysage, qui contribue à la viabilité écologique ainsi qu'à d'autres valeurs intrinsèques des zones de nature sauvage. Exiger qu'une zone de nature sauvage soit grande ne garantit pas qu'elle incorporera des régions excentrées. Nous proposons une définition descriptive de zone de nature sauvage qui reconnaît ses valeurs expérientielles ainsi que ses valeurs écologiques, autochtones et autres, et qui intègre l'éloignement en tant que caractéristique déterminante. Nous étudions l'incidence de cette définition sur la façon dont la nature sauvage est mesurée, classée, protégée, gérée et restaurée.